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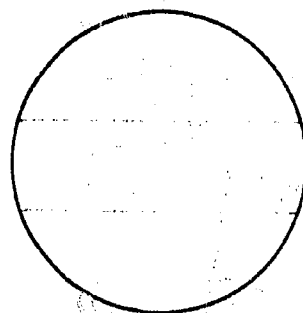
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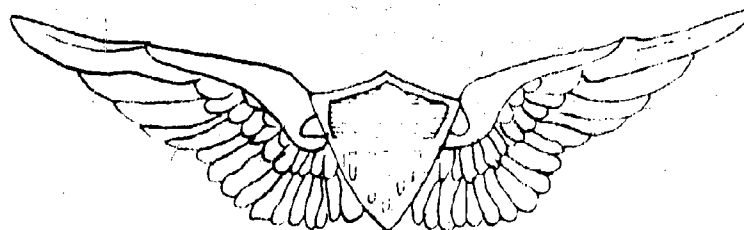
CONTINENTAL ARMY COMMAND

REPORT OF

BOARD NR. 6, CONARC



FC



PROJECT NR. NY 1125

DATE

3 FEB 1956

ATL 6.55.6.0773

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ASTIA

HEADQUARTERS CONTINENTAL ARMY COMMAND
Fort Monroe, Virginia

ATDEV-6 422/17(15 Mar 56)

15 March 1956

SUBJECT: Report of Project Nr AVN 1155, Evaluation of Gas Mask for
Helicopter Pilots (DA Proj Nr 4-80-12-007-02; RDB Tech
Obj CW-4b)

TO: Chief of Research and Development
Department of the Army
Washington 25, DC

1. Inclosed is a copy of Report of Board Nr 6, CONARC, Project Nr AVN 1155, 3 February 1956, subject: "Evaluation of Gas Mask for Helicopter Pilots (DA Proj Nr 4-80-12-007-02; RDB Tech Obj CW-4b)."

2. This headquarters concurs in part in the conclusions of Board Nr 6, CONARC, and approves the recommendations in part as restated below:


a. The Developmental Mask, of the three masks tested, be considered the most suitable for use by helicopter pilots.

b. The Developmental Mask (Mask, Protective, Tank, M-14, modified by inclusion of a nose cup integrated with the microphone) be considered suitable for use by helicopter pilots when further modified to provide a microphone compatible with the AN/ARC-44 aircraft radio.

c. A one-hour familiarization flight and periodic proficiency flights for helicopter pilots be conducted while wearing the Developmental Mask.

FOR THE COMMANDER:

1 Incl
(Over)


SAMUEL J. CHILK
Lt Colonel, AGC
Asst Adjutant General

ATDEV-6-56 60773

ARMY-CONARC- 1130

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1 Incl

Rept of Bd Nr 6, CONARC, Proj
Nr AVN 1155, 3 Feb 56, subj:
"Eval of Gas Mask for Hcptr Pi-
lots (DA Proj Nr 4-80-12-007-
02; RDB Tech Obj CW-4b)"
w/app A-C

Copies furnished:

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Dir, Marine Corps Dev Cen

HEADQUARTERS BOARD NR 6
CONTINENTAL ARMY COMMAND
Fort Rucker, Alabama

3 FEB 1956

REPORT OF TEST

PROJECT NR AVN 1155

EVALUATION OF GAS MASK FOR HELICOPTER PILOTS

(DA Proj Nr 4-80-12-007-02; RDB Tech Obj OW-4b)

1. AUTHORITY: Letter, ATDEV-6 422/91 (20 Oct 55), CONARC, 20 October 1955, subject: "Evaluation of Gas Mask for Helicopter Pilots."

2. PURPOSE:

a. To evaluate the Mask, Protective, Field, M9A1; Mask, Protective, Tank, M14; and Developmental Mask (Mask, Protective, Tank, M14, modified by inclusion of a nose cup integrated with the microphone); and determine which is more suitable for use by helicopter pilots.

b. To determine what modifications, if any, are required to produce a mask suitable for such use.

3. REFERENCES:

a. TM 3-205 Protective Masks and Accessories, April 1955.

b. TM 3-290 Individual Protective and Detection Equipment, September 1953.

4. DESCRIPTION OF MATERIAL:

a. The mask, protective, field, M9A1, consists of a molded rubber facepiece with two eyepieces, an outlet valve, nosecup, tab assembly, and head harness assembly. The M14 cannister is connected directly to the facepiece at the cheek position. The carrier is a water repellant, olive drab duck, wedge shaped bag.

b. The mask, protective, tank, M-14 is distinguished from the M9A1 by a single eyepiece of flexible plastic material, a perforated air deflector which also holds a microphone near the wearer's lips, a cable with plug for connecting the microphone to the intercommunication system, and the M10A2 cannister is hose connected rather than face mounted.

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c. The developmental mask is the M-14 modified by addition of a nose cup which reduces fogging of the lens.

5. BACKGROUND: Correspondence between Chemical Officer, IX Corps, Chief Chemical Officer, and Headquarters, CONARC indicated a requirement for helicopter pilots to wear protective mask at certain times in the event of CBR warfare. As it is highly desirable to limit the number of specialized items in the supply system, this board was directed to conduct an evaluation of standard and developmental protective masks for use by helicopter pilots.

6. SUMMARY OF TESTS:

a. Characteristics of the Mask, Protective, Field, M9A1; Mask, Protective, Tank, M-14; and the Developmental Mask were determined (Test Nr 1).

b. The Mask, Protective, Field, M9A1, is unsuitable for use by helicopter pilots (Test Nr 2).

c. The Mask, Protective, Tank, M-14, with minor exceptions, was suitable for use by helicopter pilots (Test Nr 3).

d. The Developmental Mask was suitable for use by helicopter pilots (Test Nr 4).

e. (1) The Mask, Protective, Field, M9A1 was neither suitable nor adequate with respect to radio communication.

(2) The Mask, Protective, Tank, M14, and the Developmental Mask were suitable and adequate with respect to radio communication using radio equipment presently installed in Army aircraft.

(3) None of the masks tested were suitable or adequate for use with the AN/ARC-44 radio set. (Test Nr 5)

7. DISCUSSION:

a. The results of tests 2, 3, and 4 show the Developmental Mask to be most suitable of the three masks tested. The addition of the nose cup in this mask precludes the fogging possibility exhibited by the M-14 Mask, and the single eyepiece presents less obstruction to vision than does the two eyepiece configuration of the M9A1.

b. Objectionable features noted in the Mask, Protective, Field, M9A1, and the Mask, Protective, Tank, M-14 have to a great extent been eliminated in the Developmental Mask. In view of the desirability of limiting the number of specialized items of equipment in the supply system, it is felt that a special mask for helicopter pilots is not required and the Developmental Mask is satisfactory for such use without modification. Helicopter pilots, upon issue of gas mask, should have a one hour familiarization flight wearing the mask and periodic proficiency flights.

8. CONCLUSIONS:

a. The Developmental Mask, of the three masks tested, is the most suitable for use by helicopter pilots.

b. The Developmental Mask (Mask, Protective, Tank, M-14, modified by inclusion of a nose cup integrated with the microphone) is suitable for use by helicopter pilots, with the ARC Type 12 radio equipment, without further modification.

c. At such time as the AN/ARC-44 radio set is accepted as standard for installation in Army helicopters, a compatible microphone should be provided in the gas mask.

d. A one hour familiarization flight and periodic proficiency flights for helicopter pilots should be conducted while wearing the Developmental Mask.

9. RECOMMENDATIONS:

a. The Developmental Mask, of the three masks tested, be considered the most suitable for use by helicopter pilots.

b. The Developmental Mask (Mask, Protective, Tank, M-14, modified by inclusion of a nose cup integrated with the microphone) be considered suitable for use by helicopter pilots, with the ARC Type 12 radio equipment, without further modification.

c. If, and when, the AN/ARC-44 radio set is accepted as standard for installation in Army helicopters, a compatible microphone be provided in the gas mask.

d. A one hour familiarization flight and periodic proficiency flights for helicopter pilots be conducted while wearing the Developmental Mask.

Robert R. Williams
ROBERT R. WILLIAMS
Colonel, Artillery
President

APPENDICES:

- A - Details of Test
- B - Photographs
- C - Coordination

DISTRIBUTION:

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APPENDIX A - DETAILS OF TEST

REPORT OF TEST - PROJECT NR AVN 1155

PROJECT OFFICER: CAPT. RICHARD K. WHITEHOUSE, MSC

Tests were conducted at Fort Rucker, Alabama. Gas masks were worn by pilots flying H-13H, H-34, and H-21 Helicopters.

1. TEST NR 1

a. Purpose: To determine the characteristics of the Mask, Protective, Field, M9A1; Mask, Protective, Tank, M-14; and the Developmental Mask (Mask, Protective, Tank, M-14, modified by inclusion of a nose cup integrated with the microphone).

b. Methods: The masks and appropriate publications were examined and the characteristics were determined.

c. Results:

(1) The mask, protective, field, M9A1, consists of a molded rubber facepiece with two eyepieces, an outlet valve, nosecup, tab assembly, and head harness assembly. The M11 cannister is connected directly to the facepiece at the cheek position. The carrier is a water repellent, olive drab duck, wedge shaped bag (Appendix B.1).

(2) The mask, protective, tank, M-14 is distinguished from the M9A1 by a single eyepiece of flexible plastic material, a perforated air deflector which also holds a microphone near the wearer's lips, a cable with plug for connecting the microphone to the intercommunication system, and the M10A2 cannister is hose connected rather than face mounted (Appendix B.2).

(3) The developmental mask is the M-14 modified by addition of a nose cup to reduce fogging of the lens (Appendix B.3).

2. TEST NR 2

a. Purpose: To determine the suitability of Mask, Protective, Field, M9A1, for use by helicopter pilots.

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b. Method:

(1) The M9A1 Mask was worn by helicopter pilots for periods of one hour to one hour forty-five minutes while performing the following:

- (a) Preflight inspection.
- (b) Starting and hovering.
- (c) Take-offs and landings.
- (d) Autorotative landings.
- (e) Normal cruising flights.
- (f) Confined area maneuvers.

(2) Objectionable features were noted.

c. Results: The sight image received by the pilot while wearing this mask was unsuitable for all work with the exception of normal cruising flight. The two eyepiece configuration presented an image of the two eyepieces in the center of the field of vision which is distracting to the pilot. Depth perception was noticeably poorer than normal when this mask was worn. Peripheral vision was markedly reduced while wearing this mask, which presented an unsuitable condition when performing confined area maneuvers.

3. TEST NR 3

a. Purpose: To determine the suitability of the Mask, Protective, Tank, M-14, for use by helicopter pilots.

b. Method:

(1) The M-14 mask was worn by helicopter pilots performing the following:

- (a) Preflight inspection.
- (b) Starting and hovering.
- (c) Take-offs and landings.
- (d) Autorotative landings.
- (e) Normal cruising flights.

A.2 AVN 1155

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(f) Confined area maneuvers.

(2) Objectionable features were noted.

c. Results: The single eyepiece configuration presented a much larger field of vision than was noted with the M9A1 Mask, and the depth perception distortion was not as apparent although approximately thirty minutes familiarization flight was necessary to properly evaluate depth perception. The eyepiece "fogged up" from the breath exhaled into the facepiece. Ambient temperature was 50°F.

4. TEST NR 4

a. Purpose: To determine the suitability of the Developmental Mask (Mask, Protective, Tank, M-14, modified by inclusion of a nose cup integrated with the microphone), for use by helicopter pilots.

b. Method:

(1) The Developmental Mask was worn by helicopter pilots performing the following:

- (a) Preflight inspection.
- (b) Starting and hovering.
- (c) Take-offs and landings.
- (d) Autorotative landings.
- (e) Normal cruising flight.
- (f) Confined area maneuvers.

(2) Objectionable features were noted.

c. Results: The addition of a nose cup in this mask, at ambient temperatures from 48°F to 82°F, eliminated the fogging characteristic noted in the M-14 Mask. A tendency to misjudge depth perception was noticeable on first flight but was overcome after 30 minutes to one hour of familiarization flight. The field of vision offered by the single eyepiece was adequate for all maneuvers after the familiarization flight. Pilots commented that the Developmental mask was no more uncomfortable than any oxygen mask they had ever worn. The head harness assembly was comfortable for periods of up to one hour and twenty minutes, after which some pilots noted pressure areas behind the ears.

A.3 AVN 1155

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5. TEST NR 5

a. Purpose: To determine the suitability and adequacy of each of the three masks tested, with respect to radio communication.

b. Method: Radio contact with control towers and other aircraft was attempted while wearing each of the masks. Results were noted.

c. Results:

(1) No provision for radio communication was made in the Mask, Protective, Field, M9A1. The standard radio headset was worn over the head harness of the mask and provided receiving capabilities although transmission was impossible wearing the M9A1 Mask.

(2) The microphone incorporated in the Mask, Protective, Tank, M-14 and the Developmental Mask provided adequate transmission capabilities with the ARC Type 12 radio equipment presently installed in Army helicopters. This microphone could not be used with the AN/ARC-44 radio set as it did not have the impedance required by this radio. The wearing of the radio headset over the head harness of the mask presented no difficulties and receiving capabilities were suitable and adequate.

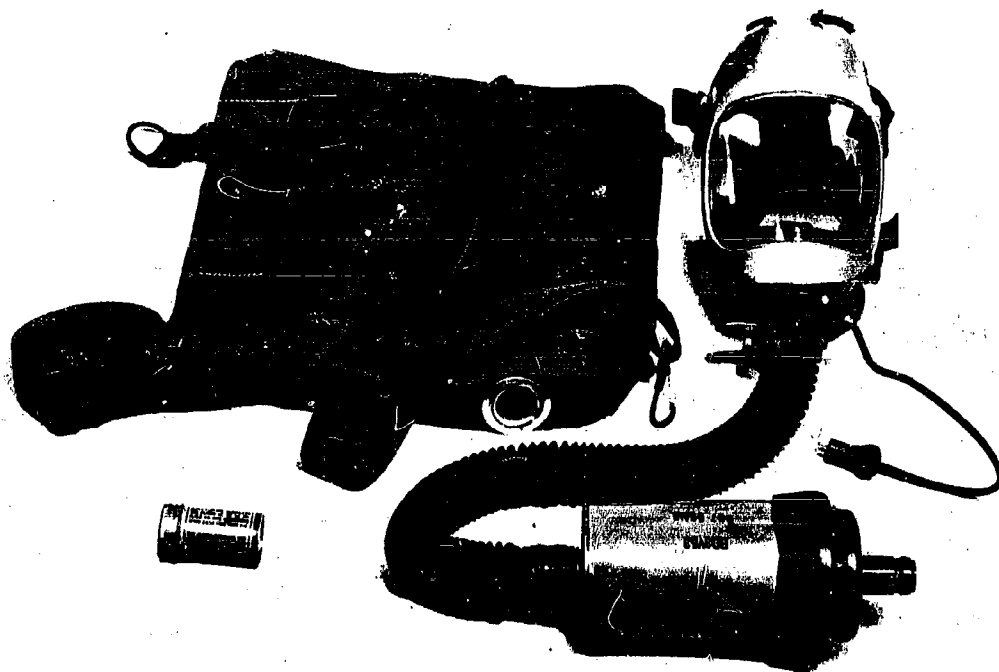


BOARD NR. 6, CONARC
FORT RUCKER, ALA.

PROJECT NR. AVN 1155
APPENDIX B.1
NEG. NR. 1

MASK PROTECTIVE FIELD M9A1

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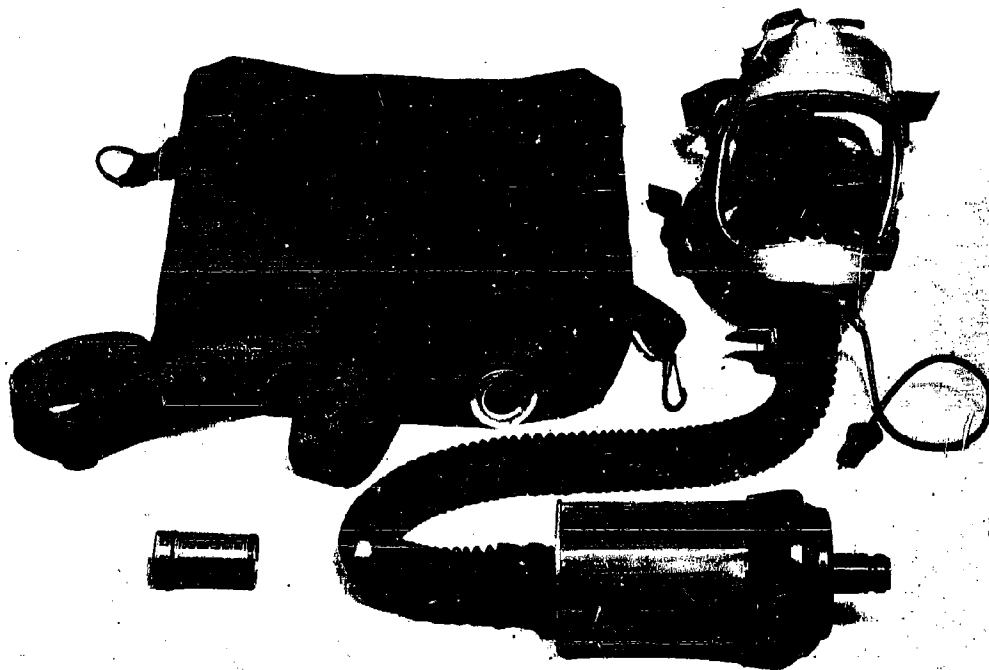


BOARD NR. 6, CONARC
FORT RUCKER, ALA.

PROJECT NR AVN 1155
APPENDIX B.2
NEG. NR. 2

MASK PROTECTIVE TANK M 14

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BOARD NR. 6, CONARC
FORT RUCKER, ALA.

PROJECT NR. AVN 1155
APPENDIX 'B.3
NEG NR 3

DEVELOPMENTAL MASK

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APPENDIX C - COORDINATION

REPORT OF TEST - PROJECT NR AVN 1155

1. The draft plan of test of Project Nr AVN 1155, "Evaluation of Gas Mask for Helicopter Pilots," was prepared by this board and circulated to other interested agencies for comment. Their replies and comments by this board are consolidated below:

a. Commanding General, Cml C Research and Engineering Command, Army Chemical Center stated:

"1. General.

a. Number of Test Items. The number of masks of each type is small. Two masks of the M14 and M14 modified types were requested by CONARC and furnished by Chemical Corps. If inconclusive results are obtained and if more masks of these types are desired they will be furnished by this Headquarters upon request."

COMMENT NR 1: No comment.

"b. Fitting of Masks. It is considered essential that the masks be carefully fitted to the subjects in accordance with information given in Section III (pp 39-44) of TM 3-205, April 1955. Since the masks furnished were of medium size, subjects whose faces will fit this size mask should be selected."

COMMENT NR 2: This board concurs, the subjects will be so selected.

"c. Temperature of tests. It is noted that no temperatures are specified in the draft plan. Since fogging of the eye lenses is a possibility under certain conditions, a series of tests at temperatures close to freezing (where fogging occurs readily) should be conducted to determine whether there are important differences between the various masks with respect to fogging characteristics."

COMMENT NR 3: This board concurs. Temperature at time of tests will be reported.

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"2. Specific.

a. Title: Technical Objective is CW-4b.

b. Par 2 b. last line: Designation of canister should be M10A2 instead of M13. The carrier for the M14 tank protective mask is designated M13. (Reference TM 3-205, April 1955, pp 38-39,)

c. Par 2 c. second line: Recommend substitution of "reduces" for "prevents."

COMMENT NR 4: This board concurs. The plan of test will be revised accordingly.

b. No reply concerning the draft plan of test has been received from Commanding Officer, SCEL. His reply and comments by this board will be forwarded upon receipt.

2. The draft report of test of Project Nr AVN 1155, "Evaluation of Gas Mask for Helicopter Pilots", was prepared by this board and circulated to other interested agencies for comment. Their replies and comments by this board are consolidated below:

a. Commanding General, Cml C Research and Engineering Command, Army Chemical Center stated:

"1. This Headquarters concurs in the conclusions and recommendations of subject report.

2. With reference to the recommendation in Paragraph 9c, any requirement which may be established for provision of a mask incorporating a microphone suitable for use with the AN/ARC-44 radio should be coordinated with the Chemical Corps."

COMMENT NR 1: This board concurs.

b. The Canadian Army thru the Canadian Liaison Officer, Board Nr 5, CONARC stated:

"2. The Canadian Army agrees with the contents of the Draft Report of Test. The Canadian Army wishes to be kept informed of further developments with particular reference to testing this mask at zero and sub zero temperatures."

COMMENT NR 2: This board concurs. Any further developments in this mask will be brought to the attention of the Canadian Army.

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c. The Director, Marine Corps Development Center replied but made no comment.

d. No reply concerning the draft report of test has been received from the following agencies:

Commanding Officer Signal Corps Engineering Laboratory

Commander, Wright Air Development Center

British Liaison Officer, Board Nr 5, COMARC

e. Their replies and comments by this board will be forwarded upon receipt.

C.3 AVN 1155

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